

“Proposed Regulations Governing the Use of Small Wind Turbines in Washington County”

By Gerald Sieren

1. Small wind turbines may be erected only on parcels of land five (5) acres and larger in size and having minimum dimensions of at least 300 feet in each direction. Parcels that are up to 40 acres in size may have up to two (2) wind turbines; larger parcels may have up to five (5).

2. In order to minimize noise, small wind turbines erected on parcels less than 40 acres in size must have a maximum design TSR of 7 and a minimum rotor diameter of five feet.

3. HAWT-type small wind turbines on parcels of land up to forty acres in size shall be limited to those with rotor diameters less than 25 feet. Tower height shall be limited to 75 feet, but must comply with set-back requirements below.

4. VAWT-type small wind turbines are limited to those less than 25 feet in height and ten feet in diameter. All rotating parts of VAWT-type small wind turbines must be at least 7 feet above the walking surface below the wind turbine. Small wind turbines using aerodynamic drag as the rotor moving force are prohibited in Washington County.

5. HAWT-type small wind turbines must be set back from property lines a minimum distance of 20 feet plus the tower height plus half the rotor diameter. This distance establishes the radius of the fall zone of the wind turbine. VAWT-type small wind turbines must be set back from property lines a minimum distance of 20 feet plus the overall height of the wind turbine, tower and/or base included.

6. Small wind turbines shall not be placed on structures, including homes and outbuildings.

7. Small wind turbines must have some positive means of shut-down. Examples of acceptable means for shutting the turbine down include but are not limited to: Dynamic braking (usually accomplished by shorting the alternator phases together). Mechanical brakes that slow and then lock the rotor

8. Small wind turbines must have some means of controlling the rotational speed of the turbine rotor in high winds. Examples of acceptable means of control include but are not limited to furling, mechanically forced yawing, and blade pitch control. VAWT-type small wind turbines, which cannot use the above controls, must still incorporate some other means, such as braking.

9. Small wind turbines that are operating erratically shall be shut down and/or lowered to the ground. Examples of erratic operation include but are not limited to the following:

- Unusual noises such as those indicating failure of bearings.
- Unusual vibrations such as those indicating that the rotor is out of balance.

Deleted: ¶

6. A fence 5 feet high must be constructed around the fall zone to keep small children from wandering into the fall zone and/or climbing the tower. This requirement is met if the entire property is fenced.¶

Deleted: 7. Small wind turbines on parcels of land less than 40 acres must be erected using only free-standing (unguyed) monopole towers, and they shall not be free-standing lattice type towers, which are generally considered unsightly. Towers on parcels of land larger than 40 acres may be of any type, but those not meeting the requirements for towers on less than 40 acre parcels must be set back from property lines a minimum distance of 2000 feet.¶

Deleted: 8

Deleted: 9

Deleted: 10

Deleted: 11

- Falling or loosely hanging parts, such as tail vanes.

10. County residents who erect small wind turbines shall do everything they can to minimize the visual impact of their wind turbines, especially the following:

- Tower colors shall be restrained. For example, red and white candy-cane or checkerboard paint designs are ill-advised.
- Night-lighting of towers and turbines is prohibited.

11. Small wind turbins must meet all applicable codes adopted by Washington County

HAWT:

- A. **Shadow Flicker:** Alternating changes in light intensity caused by the moving blade of a wind energy system casting shadows on an object, such as a window.

TSR: Stands for Tip Speed Ratio, and it is defined as the ratio of the speed of the tip of the rotor blades to the speed of the wind. It is a good indication of how noisy a small turbine will be. High TRSs are usually associated with very small diameter turbine rotors under 5 feet in diameter that may turn at up to 1500 rpm and make a lot of noise when the wind blows hard. The tip of a turbine blade with a TSR of 8 will be moving at a speed of 160 miles per hour in a 20 mile per hour wind, if it is running at its design TSR.

- B. **Total Extended Height** means the distance measured from ground level to the tip of the blade, extended at its highest point of travel.
- C. **Tower** means the supporting structure on which the turbine is mounted.
- D. **Turbine** means that portion of the wind system that is used to capture the energy of the wind and transform it into electrical or mechanical energy. The turbine includes a rotor (blades) and nacelle (generator), and on many wind systems a tail.
- E. **Wind Energy System, Commercial** means a wind energy conversion system consisting of one or more wind turbine(s) and tower(s), with associated control or conversion electronics, which will be used for on-site and/or off-site consumption of power with a rated capacity in excess of 100 kW.
- F. **Wind Energy System, Small** means a wind energy conversion system consisting of a wind turbine, a tower or other support structure, and associated control or conversion electronics with a rated capacity appropriate to the on-site electric usage of the end-use and which will be used primarily to reduce on-site consumption of utility power. A small wind energy system may have a rated capacity of up to 100 kW.

Small wind turbines: The industry considers any wind turbine with a rotor diameter between five and 70 feet to be a small wind turbine. Wind turbines with a rotor diameter of 5 feet or less are known as microturbines.

Deleted: ¶

¶ 12. Small wind turbines used for battery charging shall have a means of either diverting the turbine electrical output when the batteries are fully charged, or must be capable of automatic shutdown when the batteries are fully charged.¶

Deleted: 13. Small wind turbines that are tied to the power grid shall have a means of either diverting the turbine electrical output when the grid is down, or must be capable of automatic shutdown when the grid goes down. The automatic shutdown feature must include manual resetting to restart the turbine.¶

Deleted: 14. Small wind turbines need not be UL (Underwriters Laboratory) listed. However, if they are grid-tied, the inverters tying them to the grid must be UL listed and must meet all requirements for on-site parallel generation.

Deleted: ¶ 15. Permission from the applicable power company must be obtained before tying any¶ small wind turbine to the grid.

Deleted: 16

Formatted: Font: Not Bold

Formatted: Indent: Hanging: 0.5", Tabs: 0", Left + Not at 0.5"

- G. Wind Monitoring Tower and Equipment-Meteorological (Met) Tower** means a tower that houses or supports wind measuring equipment, such as an anemometer, for the purpose of measuring and monitoring wind velocity, duration, intensity, regularity, air temperature and pressure, etc... Met towers are typically permitted only on a temporary basis (2-5 years) to help determine the viability of a wind energy system project; although more permanent met towers may also be considered.
- H. Wind Turbine, Horizontal-Axis (HAWT)** means a wind turbine designed to have the axis of rotation aligned with the direction of the wind, such as with the common propeller type models. **HAWT: Horizontal Axis Wind Turbine.** These turbines have a rotor revolving about a horizontal axis. They look like a small airplane with a large propeller and no wings, and are the most common variety.
- I. Wind Turbine, Vertical-Axis (VAWT)** means a wind turbine designed to have the axis of rotation perpendicular to the wind direction. VAWT: These turbines have the rotor